Why Water Conservation Is Important

You know, there's nothing better than an ice cold glass of water on a hot day. I sure hope all those doom and gloom forecasters are wrong about the water, though.

What do you mean?

You know, they're saying that global climate change and population growth are gradually causing our water supplies to dwindle and that pollution is contaminating whatever water is left. But there's not much any of us can do change things anyways, so why worry.

Well, I think there is a reason to be concerned, because if we don't have enough water to drink, we'll die. But I do think there's something we can do to change things for ourselves, for our kids, and for our grandchildren. And I've heard that there's a scorecard that we get from the White House on our water conservation efforts and that score impacts a lot of things from the amount of funding that we get for projects to performance ratings for employees.

Performance ratings? Wow! Well, that's definitely something to worry about, alright.

Hi, I'm Pat Fleming. I'm a registered professional engineer with a master's degree in environmental engineering. I've practiced in the field for over 32 years, including the last 10 with the Bureau of Land Management. I'm also an accredited professional through the US Green Building Councils Leadership in Energy and Environmental Design or LEAD program. I've seen water as a very precious thing throughout my life and I've learned more about the critical nature of meeting our human needs with it throughout my career. But, as you just saw, there are varying opinions about the need to conserve water.

Welcome to this BLM Water Conservation and Management Training Program. The main purpose of this presentation is to make you aware of the requirements or mandates that direct all federal agencies, including the BLM, to conserve water and how we can all help the bureau to meet them. We'll be providing information and examples of ways to most effectively comply with these laws and executive orders to conserve and manage water in BLM facilities.

There are three recent major mandates contained in two federal laws and an executive order requiring conservation by government agencies: The Energy Policy Act or EPACT of 2005, Executive Order 13423, and the Energy Independence and Security Act, or EISA, of 2007. Requirements of these three mandates have considerable overlap and are somewhat complimentary. So, here we'll often talk about them as though they're our single requirement.

The goal of the presentation is to enable you to take actions to help BLM meet our requirements. You'll know about the mandated requirements for water conservation and be able to contribute to putting conservation and management plans in place which will measure and verify water savings. You'll be able to complete an initial water management evaluation of an assigned facility and you'll know what to do to implement identified water efficiency measures.

Following this training, you'll also be able to develop and incorporate proven approaches and strategies to conserve water. You'll know about the federal energy management program's

best management practices, or BMPs, for water conservation and you'll be able to recognize and apply the most applicable BMPs for typical BLM facilities. In using the fundamentals provided here and the information resources we'll show you, you'll be able to direct, develop, and implement a water conservation and management plan.

Across the country, our growing population is putting stress on available water supplies. Between 1950 and 2000, the US population nearly doubled and this growth is continuing. In that same period, public demand for water more than tripled. Americans now use an average of 100 gallons of water per person every day. This increased demand has put additional stress on water supplies and distribution systems everywhere. Like our energy supplies, we've known that this problem has loomed for many years and we've tried various programs and initiatives to conserve and preserve our water resources.

There's another reason that water's become a national priority. A recent government survey showed at least 36 states are anticipating local, regional, or state-wide water shortages by 2013. Climate change has begun to exacerbate this problem. Most climate change models predict widespread, prolonged drought throughout the western United States and precipitation patterns that include more short duration, high intensity events which create increased soil erosion, more stress on engineered systems that develop water resources, and a general decline of many water quality parameters.

Okay, let's say this is a real problem that everybody needs to help solve. How is the BLM a player in this whole thing?

Well, I've seen the numbers and last year BLM used over 164,000,000 gallons of water nationally in all of our facilities and our water bill was over $200,000.00.

That sounds like a lot of water, but not all that much money.

Well, I think $200,000.00 is a lot of money, especially in today's budget climate and that figure doesn't really represent all the costs. That's just the water bill. A lot of the water that BLM uses is from our own wells and we don't pay the water company for that. What we do pay for the well and the pump and the piping and the equipment and the energy to get the water out of the ground to the users. And we also pay for the maintenance and the replacement for all that stuff, too.

Well, I guess I really never thought about all those costs before. Just like the days when gas was a buck a gallon, I guess the days of cheap water are probably about over too.

Mandates and Benefits

Our BLM facilities have a tremendous opportunity to lead by example in their communities, showcasing innovative and cost-effective water efficiency strategies. In particular, the landscaping features outside our buildings can feature water efficient, attractive designs. And in the interiors, we can have well-functioning, water-saving fixtures.

Since 2005, there have been two laws and an executive order issued requiring water conservation. These mandates cover a very wide range of requirements and they sometimes overlap or supersede one another. This training will only address the requirements that pertain to water conservation and management.
They tell us what BLM **MUST** do, but we shouldn't forget that there are some very important benefits of complying!

Water conservation saves money three ways, by reducing the costs of: 1) energy, 2) water supply; and 3) wastewater treatment. Water efficiency is an integral part of every energy management program, because energy is required to pump, treat and heat water so it can be used, and more pumping and treatment later when it has become wastewater. A reduction in the amount of water used obviously reduces the costs BLM pays to local water and wastewater utility companies. Finally, through cost-effective water efficiency, scarce water resources are preserved, and our collective footprint on our natural environment is reduced.

Let's talk about the Executive Order a bit more.

On January 24, 2007, President Bush issued Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management." This order requires federal agencies to implement water-efficiency measures, including the purchase, installation, and implementation of water-efficient products and practices. The agencies must also demonstrate their improvements with measurable savings.

Beginning in fiscal year 2008, agencies must reduce water consumption intensity, relative to their fiscal year 2007 baseline use. The reduction must be 2 percent annually, for a 16 percent total, by the end of 2015. In the baseline year, the BLM used 164 million gallons of potable water. This chart shows what our annual maximum use would be to meet this goal.

Our progress in meeting this goal is reflected on our Energy Management Scorecard, which is submitted to the Department of Interior quarterly, and aggregated into the Department's results annually. The BLM final 2007 Energy Management Scorecard is shown here. This is one of three environmental management scorecards that the Department and the Office of Management and Budget use to evaluate the performance of the agencies and bureaus. This score is considered in the annual reviews of senior officials, and others to whom these responsibilities are delegated.

Best Management Practices

In assisting agencies to implement water conservation programs, the Department of Energy's Federal Energy Management Program developed a list of fourteen Best Management Practices, which they list on their website, and provide guidance for applying each one. These "BMPs," as they're called, provide a useful tool in suggesting and evaluating good approaches for water conservation. The first five listed by FEMP are shown here. Numbers 1, 2, 4 and 5 are widely applicable to BLM facilities, and we'll talk more about them.

Number 3, which deals with distribution systems, would probably only have very limited applicability in BLM's systems, in cases where we actually own a water system that serves a number of buildings or other taps.

The next five listed by FEMP are shown here. Toilets, urinals, faucets and showerheads are found in a majority of BLM's buildings, so numbers 6 and 7 are considered widely applicable. In contrast, numbers 8, 9 and 10 have very limited applicability for our Bureau's facilities. For the few cases where they apply, the information and links shown on the FEMP website, which we'll visit in a few minutes, will be very useful.

Similarly, the last four BMPs listed by FEMP are not widely applicable in BLM's facilities. Number 13 addresses miscellaneous uses of water that may occur at some BLM installations including vehicle wash systems, maintenance facilities, cleaning/laundry services, single pass air conditioners, water softening systems, and others. Number 14 looks at water uses that can be met with non-potable water from alternate water sources, such as reclaimed water, rainwater and gray water. Again, there are BLM installations where this approach is used and there may be others where it would be applicable and cost-effective. However, the specific considerations and details needed to pursue these kinds of systems are beyond the scope of this training program, and those interested should pursue the references we'll provide shortly.

Additional FEMP guidance tells us to take advantage of the EPA's WaterSense program, which provides labeling of products and certification of irrigation contractors.

On average, WaterSense labeled products are 20 percent more water-efficient than conventional models on the market, and provide equal or superior performance. All WaterSense labeled products are tested and certified to meet EPA's efficiency and performance criteria by an independent, third-party laboratory. It should be noted that WaterSense labeled products so far cover residential and light commercial applications, which would include most BLM facilities, and the program is still expanding. In heavily used public facilities, there may not be an appropriate listed product, but fixtures which aggressively conserve water should be selected by a knowledgeable professional.

Innovative water-conserving strategies were designed into the BLM's first LEED-certified building, the Escalante Interagency Visitor Center. Its landscaping features require no irrigation. The urinals use no water, and the toilets are flushed using bleed water from the evaporative coolers. In conjunction with the use of other highly efficient fixtures, these measures result in water use at this facility being less than half that of a similar, conventional facility. The initial cost difference for construction using these measures was only about 0.3 percent.

The most recent mandate we have is in the Energy Independence and Security Act of 2007. The water conservation requirements for BLM in this law are coupled with those for energy conservation and management, and include

- Completing comprehensive energy and water use evaluations,
- Identifying and implementing cost-effective energy and water efficiency measures, and then

- Following up on those implemented measures, including fully commissioning equipment, putting in place Operation and Maintenance plans, and measuring and verifying energy and water savings.

At the BLM's National Operations Center, a database has been capturing the amount of water and energy used by each of the billed accounts the BLM has nationally since 2001. The quality of this data has been greatly improved recently, and the 2007 values were used in establishing the baseline against which our water conservation improvements will be measured. In addition to this database, your facility's water use data is available from your local water utility company. There are also professionals in the National Operations Center who can help you find and interpret your water use data, and engineers and landscape architects who can assist you in your water conservation and management efforts.

You know, I think we can meet our conservation goals without spending very much money. Demand side management doesn't have to be expensive. You've heard of picking the low-hanging fruit? Well, often times that means that you can do something easy and inexpensive and still accomplish what you wanted.

Yeah, we kind of learned about that in our Value Engineering study last week. It's the Pareto Principle or the 80/20 rule. Usually 80% of the goal can be achieved by looking at the most important, or 20%, of the system.

Well, right. So if we looked at our biggest water uses and brainstormed ways to conserve and implemented some of the best ideas, we could probably meet our overall goal.

Well, who do you think could help us to brainstorm some ideas?

Well, you know what's surprising how many good ideas people come up with, when you give them the opportunity to let their ideas flow. And not only that, but the utility company has experts that they could lend us. And if we implement some of their suggestions, they also offer rebates.

Practical Examples

In BLM, the ways water is used and the amounts used vary as much as the terrain, assets, and resources we manage. We own and maintain a variety of buildings and facilities including offices, warehouses, campgrounds, marinas, and comfort stations.

The best techniques to use for water conservation will be specific to a facility and its location. But there are some typical water use patterns that we can examine here and this methodology can be used when the systems that your specific facility are audited, and the biggest water uses are identified.

In most BLM facilities, like Example #1 here, the majority of water use occurs in landscape irrigation and in toilets and urinals. In fact, in typical office buildings, almost all water use occurs in restrooms or outside in landscape irrigation.

According to EPA, in typical residential buildings, toilets account for 30% and faucets another 15% of all indoor use. These numbers are comparable to the BLM fire crew quarters example used here. As you might expect, showers are another big water use in these buildings. Irrigation is often a very significant component of water use in these facilities, too.

Focusing on these two examples, there are three obvious FEMP BMPs that could be implemented to tackle the biggest uses in Example 1 (irrigation and toilet flushing): BMP # 4 - Water-Efficient Landscaping, BMP # 5 - Water-Efficient Irrigation, and BMP # 6 - Toilets and Urinals.

In example 2, showers were also a significant use. Generally, when a fixture retrofit program for toilets and urinals is undertaken, it makes sense to evaluate the other plumbing fixtures in use at a facility, too. BMP # 7 addresses Faucets and Showerheads.

The percentage of water that can be saved using retrofits and redesigns depends on the age and nature of the things being replaced. But the performance of even the "efficient" fixtures and devices introduced in the 1980s and early 1990s is significantly surpassed by those that are currently available.

In the example facilities, let's assume that the fixtures being replaced were about 10 years old, and that about half of an irrigated turf landscape was replaced with native plant material. For the office building, a comparison of before and after water use would look something like this chart. By applying the four BMPs, there would be savings of 32 percent! Even more savings could be realized by addressing leakage and converting more landscape and irrigation.

In example 2, the fire crew quarters, the total savings in water use with these same assumptions and BMPs would be 34%. Additional savings could be realized again by fixing leaks, and you could also consider replacement of the dishwasher and clothes washing machine with new water-conserving units.

Additional Resources

Let's look at some of the information that can be accessed on the World Wide Web. There are three sites that we'll briefly visit here. Let's look on this slide. Hyperlinks are provided for each of these sites on the slide in the PowerPoint file. The first is the FEMP Water Conservation site that we've talked about. It has useful pages covering water efficiency basics, current information about federal directives, and a page listing the 14 BMPs with a link to guidance in applying each one.

Let's briefly look at the page for BMP #1 Water Management Planning. As you can see, there's a wealth of information available to someone who wants to prepare a water management plan. It talks about the content of such a plan, types of information that's available to help you prepare it, and who should see to review and approve such a plan. There are also links for useful resources that can be used in preparing it.

The EPA Water Sense site is also very useful. It contains various types of information related to water conservation, in addition to the listings of certified products and contractors that

we mentioned before. As an example, let's look at the information and listings related to water conserving toilet fixtures. If we're considering purchase of a particular model of toilet, you could very easily check to see if it had been tested and labeled by the Water Sense program. All the models that have been tested and certified by EPA are listed in this site alphabetically such that any model that is being considered can be checked.

A third website that we'll show you is the American Water Works Association Water Wiser site. This site is provided by the American Water Works Association which is a professional association dealing with the water industry in the United States. This site is a bit more technically oriented providing more specific topical information that may be useful to engineers or designers in planning their water systems. For example, their discussion forum provides topical information that can be very specific and provide current information by practitioners in the field. As you can see, there's a wide variety of topics provided, there's also an event calendar and a lot of links to other useful sites with lots of information about water conservation and management.

Water utilities all over the country have started conservation programs in response to the growing urgency for water conservations. This is particularly true in the western states where BLM manages most of its lands. Local utility companies are advantageous to work with and they are familiar with local climatic conditions and native plant materials and soils allowing a more informed recommendation for BMPs #4 & 5 using water efficient landscaping and irrigation. They also know what materials and equipment are available locally. Remember that minimizing transportation of materials and equipment reduces their embodied energy as well as their cost, both of which are keys to sustainability.

What You Can Do

Using the information now available to you, you should be able to look around in your own facility and in your home and community and evaluate the ways water's being used. If you're not directly responsible, find out who is and talk to them. Offer them your help. Only by working together, will we be able to wisely manage our water use in our facilities. And we also encourage you to constantly seek out more information and ideas that will help us to conserve our water and energy resources.

I've got lots of ideas on how we can conserve water around here and I think I've got some ideas I could use at home, too.

Well, you know, I think I've got some good ideas, too. I'm about to do a big remodeling project at home, I'm going to see what kind of rebates I can get for the kitchen and the bathroom fixtures. And, the water that comes out of the washing machine is probably just fine to use in the flower garden. Every time a big storm hits and the water runs off my roof making a big hole in the ground, I shouldn't just fix it; I should catch it and run it over into the tree wells. And when I wash the car, I'll just pull it onto the lawn and I'll take showers with the dog and what I'll do, is with the radiator water in my car……